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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/046,497	10/26/2001	Er-Xuan Ping	MTI-31041-A	8624
22202	7590	10/26/2004	EXAMINER	
WHYTE HIRSCHBOECK DUDEK S C			LE, THAO X	
555 EAST WELLS STREET			ART UNIT	
SUITE 1900			PAPER NUMBER	
MILWAUKEE, WI 53202			2814	

DATE MAILED: 10/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/046,497	Applicant(s) PING ET AL.	
	Examiner Thao X Le	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 101-116 and 123-223 is/are pending in the application.
- 4a) Of the above claim(s) 101-116, 123-142, 156-166, 194 and 195 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 143-155, 167-193 and 196-223 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>07/13/04&amp;10/04/04</u>   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 143-145, 147, 149-155, 167-193, 196-223 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5483094 to Sharma et al.

Regarding to claims 143, 182, 186, 197 Sharma discloses a semiconductor structure in fig. 12, comprising at least two overlying layers 33/34 of epitaxial silicon (ES), column 3 line 42, each ES layer comprising a top surface, and sidewalls, and insulative materials 41/61, column 4 line 64, over the sidewalls, an uppermost ES layer 34 of the at least two overlying layers having a top surface with an overlying layer of an insulative material 41/61, wherein the structure is disposed on a substrate in a vertical orientation.

Regarding to claims 144-145, 147, Sharma discloses the semiconductor structure wherein the insulative layer 41/61 comprises an oxide, column 4 line 66, wherein the insulative layer comprises a silicon nitride, column 5 lines 29-32.

Regarding to claims 149, 179, 190, 196, 198, Sharma discloses a semiconductor structure in fig. 12, comprising at least two overlying layers 33/34 of ES, each ES layer comprising a top surface, and sidewalls, and insulative materials 41/61 over the sidewalls, an uppermost ES layer 34 of the at least two overlying layers having a top surface with an overlying layer of an

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insulative material 41/61, one or more of the ES layers comprising a conductivity enhancing dopant, column 3 lines 50-67, wherein the structure is disposed on a substrate in a vertical orientation.

Regarding claims 150-153, Sharma discloses the conductivity enhancing dopant comprising a p-type dopant, which is selected from the group consisting of boron, wherein the conductivity enhancing dopant comprising a n-type dopant, which is selected from the group consisting of phosphine, column 4 lines 12-17.

Regarding claims 154-155, Sharma discloses the semiconductor structure wherein one or more of the ES layers comprises a concentration gradient of the dopant within the ES layer, wherein the concentration gradient comprises a low to high concentration of the dopant within the ES, with the high dopant concentration at the top surface of the layer, column 3 line 55-67.

Regarding claims 167-172, 174-175, 177, 178, 180-181, 183-185, 187-189, 191-193 Sharma discloses the semiconductor structure being a component of a transistor, being a transistor gate, being a S/D diffusion region, fig. 12.

Regarding to claims 173, 176, 199, Sharma discloses a semiconductor structure in fig. 12, comprising at least two overlying layers 33/34 of epitaxial silicon (ES), column 3 line 42, each ES layer comprising a top surface, and sidewalls, and insulative materials 41/61, column 4 line 64, over the sidewalls, an uppermost ES layer 34 of the at least two overlying layers having a top surface with an overlying layer of an insulative material 41/61, wherein the structure is disposed on a substrate in a vertical orientation, wherein the structure being a component of a transistor, fig. 12.

Regarding claims 200-223, as discussed in the above claims, Sharma discloses all the limitations of claims 200-223

Claims 203-223 are product-by-process, thus all the process limitations in claims 203-223 do not carry weight in a claim drawn to structure. In re Thorpe, 277 USPQ 964 (Fed. Cir. 1985).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 146, 148 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5483094 to Sharma et al.

Regarding claims 146 and 148, Sharma does not expressly disclose the thickness of the insulative layer about 5 to 20 nm or 2 to 5 nm.

However, Sharma reference discloses an insulative layer 41 has the thickness less than 20 nm, fig. 12, column 28-35. Accordingly, it would have been obvious to one of ordinary skill in art to use thickness teaching Sharma in Kim device in the range as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

#### ***Response to Arguments***

4. Applicant's arguments filed 29 June 2004 have been fully considered but they are not persuasive. The Applicant argues on the ground that Sharma does not disclose multiple overlying epitaxial silicon layers. This is not persuasive because Sharma show in fig. 10 pillar 31 is epitaxial silicon (ES), column 3 line 42 that comprises three ES layers 32, 33, and 34. There is no distinction in the process whether each ES layer is being formed separately or simultaneously. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985), MPEP 2113. The distinctive structural limitation of the claimed invention is EXPITAXIAL SILICON; thus epitaxial silicon pillar 31 comprises layers 32,33 and 34 of Sharma would read on the claim limitations.

***Conclusion***

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thao X. Le  
18 Oct. 2004



LONG PHAM  
PRIMARY EXAMINER